

WHAT IS CLAIMED

1) A contact start plasma torch, wherein it comprises, inside a torch body extending mainly longitudinally:

- a hollow shaft, connected on one side to a first supply pipe for a flow of a first gas and, on the other side, to an electrode which is hollow so that it surrounds part of the shaft and forms, close to the internal end of the electrode, a first, internal chamber for cooling the inside of the electrode and for outfeed of the first gas;

- a nozzle, which can be electrically connected to a positive pole, surrounding the electrode and forming:

- a second chamber, for receiving the first gas for generating plasma;

- a third, intermediate chamber, for the passage of the first gas, the latter arriving from the first, cooling chamber through third pipes made in the shaft and the nozzle, to at least the second, plasma generation chamber through second pipes passing through the nozzle;

- first sealing parts, being inserted between the shaft and the nozzle and on both sides of the third pipes, forming a sealed zone close to the third pipes;

- shaft drive means, consisting of a cylinder, connected to the shaft and acting on the shaft by means of an inflow and, respectively, an outflow of a second operating fluid, the latter being separate from the first gas, in a fourth chamber of the cylinder, to provide a forward starting position, in which the electrode is in contact with the nozzle, and a back torch operating position, in which the electrode is distanced from the nozzle, in the presence of the first gas.

2) The torch according to claim 1, wherein the first sealing parts comprise at least two O-rings housed in relative seats made in the shaft and positioned on both sides of the third pipes.

3) The torch according to claim 1, wherein the first sealing parts comprise two O-rings which are floating "O-rings" housed in relative seats

in the shaft and positioned on both sides of the third pipes.

- 4) The torch according to claim 1, wherein the nozzle comprises a first insulating bushing, partially surrounding a second bushing, more internal than the first insulating bushing, and forming a portion of the hollow shaft; the third pipes being made in the first and second bushings, having opposite annular recesses forming a sealed zone for the continuous passage of the first gas between the first and third chambers, irrespective of the position assumed by the shaft, said zone being delimited by the first sealing parts on both sides.
- 5) The torch according to claim 1, wherein the cylinder is connected to the rear end of the shaft, opposite the end of the shaft with the electrode.
- 6) The torch according to claim 1, wherein the cylinder is connected to the rear end of the shaft, opposite the end of the shaft with the electrode; the cylinder forming a fifth chamber connected to the shaft and allowing the passage

of the first gas in the shaft and a fourth chamber for receiving the second operating fluid so as to provide the shaft forward and, respectively, back positions.

- 7) The torch according to claim 6, wherein the fourth chamber is fitted with valve means for rapidly discharging the second operating fluid when passing from the shaft forward position to the back position.
- 8) The torch according to claim 6, wherein the fifth and fourth chambers are directly connected to a relative first and second supply channel, respectively for the first gas and the second operating fluid.
- 9) The torch according to claim 8, wherein the second channel is fitted with valve means for rapidly discharging the second operating fluid when passing from the shaft forward position to the back position.
- 10) The torch according to claim 9, wherein the rapid discharge valve means comprise a unit for connection and selection of the second fluid

inflow, being inserted between the second supply channel and the fourth chamber; the unit having a fork consisting of a first and a second hole respectively giving onto the fourth chamber and the outside of the torch and separated from the second channel by a sealing part designed to form the connections between the second channel and the first hole or both the first and second holes, depending on the position which can be assumed by the shaft.

- 11) The torch according to claim 10, wherein the sealing part is ring-shaped, forming a valve which is mobile, inside the unit, between a first position allowing the passage of the second fluid towards the first hole, in which the seal is distanced from the second channel and blocks the second hole, and a second position for discharging the second fluid, in which the seal blocks the second channel, allowing communication between the first and second holes.
- 12) The torch according to claim 11, wherein spring means act upon the sealing part, said spring means being inserted between the sealing part

and an internal surface of the unit so as to allow the seal to pass rapidly from the first position to the second, discharging position.

- 13) The torch according to claim 10, wherein the sealing part has a cylindrical shape, surrounding an internal end portion of the second channel and held at its ends on both sides by annular projections of the end portion and, respectively, of the unit, allowing a deformation of the section of the seal according to the position which can be assumed by the shaft and, therefore, the pressures from the second channel or from the first hole.
- 14) The torch according to claim 10, wherein the sealing part is ring-shaped, forming a valve which moves by means of a circular contact guide attached to the connecting unit; the sealing part moving, inside the unit, between a first position allowing the passage of the second fluid towards the first hole, in which the seal is distanced from the second channel and blocks the second hole, and a second position for discharging the second fluid, in which the seal blocks the second channel,

allowing communication between the first and second holes.

- 15) The torch according to claim 6, wherein the cylinder has second sealing parts designed to separate the fourth and fifth chambers from one another and, respectively, the fifth chamber from the rest of the torch body.
- 16) The torch according to claim 15, wherein the second sealing parts comprise at least two O-rings housed in relative seats in the cylinder and positioned on both sides of the fifth chamber.
- 17) The torch according to claim 15 wherein the second sealing parts comprise at least two O-rings which are floating "O-rings" housed in relative seats in the cylinder and positioned on both sides of the fifth chamber.
- 18) The torch according to claim 1, wherein spring means are inserted between the torch body and the shaft, the spring means being designed to allow the shaft to slide rapidly from the forward position to the back position when the

second operating fluid flows out of the cylinder.

- 19) The torch according to claim 18, wherein the spring means are inserted between a wall formed by a fixed internal support of the torch body, slidably housing the shaft, and a cylinder front supporting wall.
- 20) The torch according to claim 1, wherein the second operating fluid is a gas.
- 21) The torch according to claim 1, wherein the second operating fluid is air.
- 22) The torch according to claim 1, wherein the nozzle and electrode have a respective annular contact surface for torch starting in a position forming an intermediate zone between the distal end and the proximal end of the electrode.
- 23) The torch according to claim 22, wherein the annular surfaces of the nozzle and the electrode have flat contact faces.

- 24) The torch according to claim 1, wherein the nozzle is supported by a nozzle holder, forming a distal portion of the torch body, and having fourth pipes allowing the first gas to exit the third, intermediate chamber to the outside of the torch body and around the nozzle, so as to cool the outside of the nozzle, the nozzle comprising a first insulating bushing divided into two separate portions, through one of which the second pipes pass.
- 25) The torch according to claim 1, wherein it comprises a flexible cable connected, on one side, to the first supply pipe for the first gas and to the torch negative pole, the other side of the cable being connected, by its terminal, to the hollow shaft, to provide a stable connection and current flow.